A Superfluid Model of the Nucleus

S/020/60/133/02/20/068
B019/B060

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

PRESENTED: April 21, 1960, by N. N. Bogolyubov, Academician

SUBMITTED: April 21, 1960

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SOLOV'YEV, V.G.

[Superconductive pair correlations in atomic nuclei; dissertation
presented in candidacy for the degree of Doctor of Physics and
Mathematics] Parnye korreliatsii sverkhprovodiashchego tipa v atom-
nykh iadrakh; dissertatsiia, predstavlennaia na soiskanie uchenoi ste-
peni doktora fiziko-matematicheskikh nauk. Dubna, Ob"edinennyi in-
stitut iadernykh issledovanii, 1961. 84 p.   (MIRA 14:11)
      (Atomic nuclei)   (Superconductivity)

SOLOV'YEV, V.C.

Studying the properties of heavily deformed nuclei on the basis of a nuclear model which takes pair correlations into account. Izv.AN SSSR.Ser.fiz. 25 no.10:1198-1216 O '61.
(MIRA 14:10)

1. Laboratoriya teoreticheskoy fiziki Ob"yedinennogo instituta yadernykh issledovaniy.
(Nuclear models)

24. 6520

AUTHOR: Solov'yev, V. G.

TITLE: Study of the properties of transuranic elements on the
             basis of the superfluid model of the nucleus

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki,
             v. 40, no. 2, 1961, 654-665

TEXT: The superfluid model has been developed in an earlier work by
Solov'yev (Ref. 2: DAN SSSR, 133, 325, 1960) on the basis of the theory
of superfluidity and superconductivity by N. N. Bogolyubov. The present
paper proceeds from this model to study the properties of strongly
deformed transuranic elements. A Nilsson potential, whose energy levels
are slightly corrected to fit experimental data, is used as self-
consistent field. The single-particle levels of both odd and even-odd
nuclei are calculated in adiabatic approximation along with the pairing
energy and the corrections to β- and γ transition probabilities. Part 1
deals with the assumptions of the model and the fundamental equations;
proceeding from the Hamiltonian

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$$H = \sum_{s\mathfrak{a}} \left(E(s) - \lambda \right) a_{s\mathfrak{a}}^{+} a_{s\mathfrak{a}} - G \sum_{s,s'}' a_{s+}^{+} a_{s-}^{+} a_{s'-} a_{s'+}. \tag{1}$$

$$\mathcal{E} = \sum E(s) \left\{ 1 - \frac{E(s) - \lambda}{[C^2 + (E(s) - \lambda)^2]^{1/2}} \right\} - \frac{C^2}{G}. \tag{5}$$

is obtained for the energy in the ground state, and

$$\Psi = \prod_{s} \left(u_s + v_s a_{s+}^{+} a_{s-}^{+} \right) \Psi_0. \tag{6}$$

$a_{s\mathfrak{a}} \Psi_0 = 0$ и

$$u_s^2 = \frac{1}{2} \left\{ 1 + \frac{E(s) - \lambda}{[C^2 + (E(s) - \lambda)^2]^{1/2}} \right\}, \qquad v_s^2 = \frac{1}{2} \left\{ 1 - \frac{E(s) - \lambda}{[C^2 + (E(s) - \lambda)^2]^{1/2}} \right\} \cdot \tag{7}$$

for the wave function in the ground state; the wave functions of the excited states are found by

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$$\Psi(s_1, s_2) = \prod_{s \neq s_1, s_2} (u_s + v_s a_{s+}^* a_{s-}^*) a_{s_1}^* a_{s_2}^* \Psi_0, \quad s_1 \neq s_2. \tag{8}$$

$$\Psi(s_1, s_1) = \prod_{s \neq s_1} (u_s + v_s a_{s+}^* a_{s-}^*) (u_{s_1} a_{s_1+}^* a_{s_1-}^* - v_{s_1}) \Psi_0. \tag{8'}$$

energies and basic equations read

$$\mathcal{E}(s_1, s_2) = E(s_1) + E(s_2) + \frac{1}{2} G(v_{s_1}^2 + v_{s_2}^2) +$$

$$+ \sum_{s \neq s_1, s_2} E(s) \left\{ 1 - \frac{E(s) - \lambda}{[C^2 + (E(s) - \lambda)^2]^{1/2}} \right\} - \frac{C^2}{G}. \tag{9}$$

$$\frac{2}{G} = \sum_{s \neq s_1, s_2} [C^2 + (E(s) - \lambda)^2]^{-1/2}, \quad n = 2 + \sum_{s \neq s_1, s_2} \left\{ 1 - \frac{E(s) - \lambda}{[C^2 + (E(s) - \lambda)^2]^{1/2}} \right\}. \tag{10}$$

In case of an odd envelope, if the odd nucleon is in the state s_1, energy and basic equations are given by

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$$\delta(s_i) = E(s_i) + \frac{G}{2} v^2_{s_i} + \sum_{s \neq s_i} E(s) \left\{ 1 - \frac{E(s) - \lambda}{[C^2 + (E(s) - \lambda)^2]^{1/2}} \right\} - \frac{C^2}{G}, \quad (11)$$

and

$$\frac{2}{G} = \sum_{s \neq s_i} [C^2 + (E(s) - \lambda)^2]^{-1/2}, \quad n = 1 + \sum_{s \neq s_i} \left\{ 1 - \frac{E(s) - \lambda}{[C^2 + (E(s) - \lambda)^2]^{1/2}} \right\} \quad (12) \qquad (12).$$

Pairing energy and single-particle levels of odd nuclei are calculated in chapter 2. The effect of superfluidity upon the behavior of single-particle levels of odd nuclei has the following results: 1) superfluidity leads to no variation of the nuclear ground state given by the Nilsson scheme; 2) with lessening interaction constant G, the excitation energy also decreases; 3) on an increase of G, the hole- and particle levels behave differently, but the succession of hole (particle) levels still remains unchanged relative to one another. To conform with experimental results, the Nilsson level schemes must be subjected to

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minor changes. With Eqs. (5) and (11) one then obtains for the pairing
energy $P_N(Z,N) = 2\varepsilon(Z,N-1) - \varepsilon(Z,N) - \varepsilon(Z,N-2)$ for $C = 0.016, 0.020,$
and $0.024 \hbar\omega_0$. Numerical results (for neutrons) are given in Table 1,
from which one may see how strongly the pairing energy is dependent of C.
Table 2 gives, in a similar representation, the proton pairing energies.
Table 3 illustrates the dependence of C, $\ldots$, and Δn on C ($\varepsilon = 0.26$,
$\Xi_7 = 5.628 \ \ldots_0$). As may be seen, C and $\ldots$ undergo a considerable change
both on the transition from an even to an odd nucleus and on the transi-
tion from the ground state to the excited state. Table 4 gives data
concerning the excited states of odd nuclei. Chapter 3 deals with the
excitation spectra of even-even nuclei calculated by using the
equations given in the introduction; results are listed in Tables 5-9.
Chapter 4 gives the results of the calculation of corrections to the
β- and γ transition probabilities. The correction to the β decay of an
odd nucleus, in which a neutron passes from the state s_1 into a proton
in the state s_2, is given with

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$$(N = 2n_N + 1; \ Z = 2n_Z) \to (N = 2n_N; \ Z = 2n_Z + 1).$$

$$R = (u_{s_i}^{2n_N} u_{s_i}^{2n_Z})^2 \prod_{s \ne s_i} (u_s^{2n_N} u_s^{(s_i)(2n_N+1)} + v_s^{2n_N} v_s^{(s_i)(2n_N+1)})^2 \times$$

$$\times \prod_{s' \ne s_i} (u_s^{2n_Z} u_s^{(s_i)(2n_Z-1)} + v_s^{2n_Z} v_s^{(s_i)(2n_Z+1)})^2. \tag{18}$$

the correction to the β-decay probability of an even-odd nucleus, i.e., the decay $(N = 2n_N+1, \ Z = 2n_Z-1) \longrightarrow (N = 2n_N, \ Z = 2n_Z)$ is given by

$$R_0 = (u_{s_i}^{2n_N} v_{s_i}^{2n_Z})^2 \prod_{s \ne s_i} (u_s^{2n_N} u_s^{(s_i)(2n_N+1)} + v_s^{2n_N} v_s^{(s_i)(2n_N-1)})^2 \times$$

$$\times \prod_{s' \ne s_i} (u_s^{2n_Z} u_s^{(s_i)(2n_Z-1)} + v_s^{2n_i} \cdot v_s^{(s_i)(2n_Z-1)})_2. \tag{19}$$

$$\tag{19.}$$

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Numerical data are given by Tables 10 and 11. N. N. Bogolyubov is finally thanked for his interest and discussions, I. N. Silin for his programing and carrying out of numerical computations, as well as N. I. Pyatov, V. I. Furman, and Lyu Yuyan' for their assistance in interpreting the results. There are 11 tables and 11 references: 9 Soviet-bloc and 2 non-Soviet-bloc.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy
               (Joint Institute of Nuclear Research)

SUBMITTED: September 15, 1960

N	s	Энергии спаривания P_N, MeV (1)			
		$G = 0.016$ Аω.	0.020 Аω.	0.024 Аω.	Эксперимент ["] (2)
150	0.26	0.43	0.94	1.58	0.7—1.1
148	0.26	0.23	0.88	1.57	0.8—1.2
146	0.26	—	0.82	—	0.7—0.9
144	0.24	0.27	0.97	1.69	0.8—1.0

Tab. 1

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LYU YUYAN' [Liu Yüan]; PYATOV. N.I.; SOLOV'YEV, V.G.; SILIN, I.N.;
    FURMAN, V.I.

Properties of strongly deformed nuclei. Zhur. eksp. i teor.
fiz. 40 no.5:1503-1510 My '61.   (MIRA 14:7)

1. Ob"yedinennyy institut yeadernykh issledovaniy.
                (Nuclei, Atomic)

23851

24.4500 (1158, 1395, 1538)

AUTHOR: Solov'yev, V. G.

TITLE: Beta decay of strongly deformed nuclei

PERIODICAL: Doklady Akademii nauk SSSR, v. 137, no. 6, 1961, 1350-1353

TEXT: The author has earlier developed a superfluid model of atomic nuclei
(ZhETF, 40, 654 (1961); ZhETF, 40, no. 5 (1961)) on the basis of mathemati-
cal methods devised by N. N. Bogolyubov. This model permits taking account
of the changes of the superfluid properties of a nucleus in its transition
from the ground state to an excited state. As has been already shown
previously, the superfluid correction to the probability of beta and gamma
transitions in strongly deformed nuclei is very important in many cases.
General rules are formulated here for constructing the correction to the beta
decay; these rules are related to the superfluid ground and excited states.
A comparison is made with the selection rules by Gallagher for the classifi-
cation of the probabilities of a beta decay of strongly deformed nuclei, and
the role of "superfluid correction" is studied by a comparison of the

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quantities $\log(ft)$ for beta transitions between equal single-particle states of different nuclei. Wave functions, equations, and denotations from the author's previous studies are used for the general rule serving for the construction of the correction R; they are not dealt with in detail here. Neutron system and proton system in the nucleus are considered to be independent. R is written in the form

$$R = \gamma \prod_{s \neq f_1 \cdots f_k} (u_s u'_s + v_s v'_s)^2: \qquad (3),$$

where u_s, v_s belong to the initial state, u'_s, v'_s to the end state. This product lacks a factor corresponding to the levels, on which quasiparticles appear. The pair correlations in this product are equal to unity. Furthermore, $\gamma = u_f^2$ if the coupled pairs in the initial state are the same as in the end state; if, however, the number of coupled pairs changes in the decay, then $\gamma = v_f^2$, where f belongs to that level at which the quasiparticles are annihilated or produced. The functions u_f^2 and v_f^2 in (3)

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characterize the superfluid properties of the system with a lesser number of quasiparticles. The case is then examined in which the pair-interaction constant G tends toward zero, i.e., the model turns into a model of independent particles. Then, $R = 1$ or $R = 0$. $R = 1$ corresponds to the case where the beta decay takes place without a change in the position of a nucleon, with the exception of one. $R = 0$ corresponds to a model in which the position of more than one nucleon changes in a beta decay. In a comparison with Gallagher's selection rules, all beta transitions are classified into three groups:

$$\text{I} \quad \text{р р у п п а} \quad R(G = 0) = 1, \quad 0 < R(G \neq 0) < 1.$$
$$\text{II} \quad \text{р р у п п а} \quad R(G = 0) = 0, \quad 0 < R(G \neq 0) < 1. \qquad (\text{A}).$$
$$\text{III} \quad \text{р р у п п а} \quad R(G = 0) = 0, \quad R(G \neq 0) = 0.$$

To the first group belong beta decays in which the initial and end states of the system are the ground state; moreover, the partial transitions in the case of an unchanged number of pairs, and the hole transitions, if the number of pairs changes by one. To the second belong all hole transitions in the case of an unchanged number of particle pairs and the partial transi-

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tions, if the number of particle pairs changes by one. To the third group belong transitions, in which the number of quasiparticles in the proton- or neutron system changes by more than one; moreover, those transitions where, jointly with a change of the number of quasiparticles by one, the position of the other quasiparticles changes. The analysis of experimental data shows that over 20 beta transitions can be safely assigned to group 2. This is convincing evidence of the advantages offered by the superfluid model of the nucleus, as compared with other models. Moreover, this proves the existence of pair interaction. The effect of the single-particle matrix element on the relative value of $\log(ft)$ is found not to be eliminated completely. Data are presented in Table 1 for the beta transitions between pairs of equal single-particle states. As may be seen from the table, taking the pair correlation into account explains the retardation of the $Gd^{159} \longrightarrow Tb^{159}$ process, where the proton transition belongs to the second group, and the neutron transition to the first group, compared with the $Er^{161} \longrightarrow Ho^{161}$ process, where both belong to the first group. The classification of beta transitions given here has proved very useful for even nuclei. As has been shown by Gallagher et al. (Nucl. Phys., 19, 18, (1960)), single-

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particle transitions in beta decays of odd and even nuclei take place at about the same velocity. Professor N. N. Bogolyubov is thanked for his discussions, N. I. Pyatov, I. N. Silin, and V. I. Furman for their assistance in the calculations. There are 1 table and 11 references: 6 Soviet-bloc and 5 non-Soviet-bloc.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

PRESENTED: December 26, 1960, by N. N. Bogolyubov, Academician

SUBMITTED: November 15, 1960

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25851
S/020/61/139/004/011/025
B104/B209

24.4500

AUTHOR: Solov'yev, V. G.

TITLE: The principal properties of the nuclear model of super-
             fluidity

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 4, 1961, 847-850

TEXT: The principal properties of the nuclear model of superfluidity are
studied: Dependence of the characteristic of superfluid state and of the
levels of the even system on the pair-interaction constant G, superfluid
properties of excited two-quasiparticle states of the system, specific
properties of the 0+ state, etc. The behavior with rising G of the ground
state and of the excited two-quasiparticle state is studied by means of a
neutron system with $N = 106$ (as, e.g., Hf^{178}), as an example. The energies
of ground state, of the excited states, and the quantities 2C of the gaps
for $G = 0.016$; 0.020; $0.024 \hbar \overset{\circ}{\omega}$ are shown in Fig. 1a. Fig. 1b presents the
energies of the ground state and of the excited states as calculated on a
computer. The energies of the excited two-quasiparticle states calculated

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on the basis of the nuclear model of superfluidity differ, in the case of
small G, from the behavior in case a, where an increase of the energies

with rising G up to $G = 0.020\hbar\omega$, can be observed. This is related to the
inaccuracy of the present investigations. In case b, the energies of both
ground state and excited states decrease differently with increasing G.
Analysis of the correlation functions $C(k_1, k_2)$ showed that there is a

difference in the correlation functions of the excited states at $G = 0.020\hbar\omega_0$,
corresponding to real nuclear forces. One of the most important results of
these calculations is the discovery that the energy of one or of several
excited states drops below the amount of 2C of the gap. This fact is
connected with the Pauli principle. Agreement between theory and experiment
concerning this energy drop of states below the gap is one of the most
important confirmations of the nuclear model of superfluidity and proves
this nuclear model to be useful in studying highly-deformed nuclei. Results
are better than those obtained with the initial pair-correlation method.
A specific place among the excited states is held by 0+ states with two
quasiparticles on one and the same one-particle level of the average field.
The wave functions of these states are not orthogonal, neither mutually nor

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to the wave functions of the ground states. The dependence of G on the
non-orthogonality of the wave functions of these states is examined. It
was found that with $G \rightarrow 0$ the states (k, k) and $(k+1, k+1)$ are confluent
into one only. A rise in G entails a decrease in the non-orthogonality of
the states (k, k) and $(k+1, k+1)$ and an increase in the non-orthogonality
between the other states. In an estimation on the accuracy of the present-
ed method it is shown that the difference between the superfluid properties
of the excited states and of the ground state of an even system does not
arise from an error in the method but that it really exists. The author
thanks N. N. Bogolyubov for discussions, I. N. Silin and N. I. Pyatov for
assistance in the calculations. Part of the work was finished by the
author during his activity at the Institute of Theoretical Physics of
Copenhagen University. Professor Niels Bohr is thanked for his hospitality
O. Bohr and B. Mottel'son are thanked for discussions. There are 1 figure,
3 tables, and 6 references: 6 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint
               Institute of Nuclear Research)

Card 3/5

SOLOVYEV, V.G.; SARANTSEVA, V.K., tekhn. red.

Effect of pairing correlations of the superconductive type
on the alpha decay rates. Dubna Ob"edinennyi in-t iadernykh
issledovanii, 1962. 6 p.

(No subject heading)

SOLOV'YEV, V.G.; ZARUBINA, I.S.[translator]

Properties of the ground-and excited states of strongly
deformed nuclei. Dubna, Ob"edinennyi in-t iadernykh is-
sledovanii, 1962.   17 p.
                    (No subject heading)

VOROS, T.; SOLOV'YEV, V.G.;SIKLOS, T.; SARANTSEVA, V.R., tekhn. red.

An investigation of properties of transuranic elements.
Dubna, Ob"edinennyi in-t iadernykh issledovanii, 1962. 23 p.
(No subject heading)

24.6300

S/048/62/026/008/016/028
B104/B102

AUTHORS: Veresh, T., Solov'yev, V. G., and Shiklosh, T.

TITLE: Study of properties of the transuranic elements

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26,
              no. 8, 1962, 1045 - 1060

TEXT: The properties of nuclei in the range of $225 \leq A \leq 255$ were studied
by an improved calculation scheme (V. G. Solov'yev et al., Izv. AN SSSR.
Ser. fiz., 25, 1198 (1961); Mat.-Fys. Skr. Dan. Vid. Selsk., 1, no. 11
(1961); Mat.-Fys. Skr. Dan. Vid. Selsk., 31, no. 2, (1959); OIYaI Preprint
P-801 (1961)) using parameters based on experimental data of single-quasi-
particle levels of odd nuclei and pairing energies. The probabilities of
β-transitions are analyzed and the energies of two-quasiparticle levels
are calculated for a series of even-even nuclei. The results are given
in extensive diagrams and tables. Good agreement between experiment and
calculation is achieved on the basis of the superfluidity model of the
nucleus. Further investigations into the excited states of the transuranium
elements must depend on getting additional experimental data. There are 8
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figures and 13 tables.

ASSOCIATION: Laboratoriya teoreticheskoy fiziki Ob"yedinennogo instituta
yadernoy fiziki (Laboratory of Theoretical Physics of the
Joint Institute of Nuclear Physics)

$\sqrt{\beta}$

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S/056/62/043/001/035/056
B102/B108

AUTHOR: Solov'yev, V. G.

TITLE: Properties of the ground and excited states of highly
            deformed nuclei

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43,
            no. 1(7), 1962, 246-255

TEXT: On the basis of the superfluid model of the nucleus (DAN SSSR, 133,
325, 1960; 139, 847, 1961) and with the neutron and proton pair interac-
tion constants, $G_N = 26\ A^{-1}$ Mev and $G_Z = 29\ A^{-1}$ Mev, respectively, the
energies of some levels of even-even nuclei and the β-transition
probabilities in even and odd nuclei are calculated. State, energy, spin,
parity, kind of β-decay, and energy released in β-transition into the
ground state of isotopic nuclei of the following elements are given: Er,
Tm, Lu, Ta, Hf, Re, Pa, Gd, Yb, Ho, W, and Pu ($_{94}Pu^{240}$). For several
cases the most favorable experimental conditions are given, in order to

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find three and four-quasiparticle states populated during the corresponding
β-transitions. It is pointed out that all levels of even-even nuclei
predicted by the superfluid model must be verified experimentally. Also
F-forbiddeness analyses are discussed; e.g., the 1F-forbidden β-decay of
the 7.7 - hr Tm^{166} passes from the 2^+-state (configuration p411$\downarrow$ - n642$\uparrow$)
into the neutron state 1^- of Er^{166} (523$\downarrow$ - 633$\uparrow$) with $E = 1.828$ Mev.
It is demonstrated that an experimental determination of the
F-forbiddenness of β-decays may indicate the effect of residual forces
not taken into account in the superfluid model, on the properties of
the ground and excited states. For the determination of these properties
it is further necessary to determine the three and four-quasiparticle
excited states of strongly deformed nuclei. There are 2 figures and
3 tables.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Insti-
tute of Nuclear Research)

SUBMITTED: February 20, 1962

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S. 020/62, 144/006/012/015
B108/B102

AUTHOR: Solov'yev, V. G.

TITLE: Effect of superconduction-type pair correlations on the
               α-decay rate

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 6, 1962, 1281-1284

TEXT: Superconduction-type nucleon pair correlations have a considerable
effect on the ground states and excited states of atomic nuclei. They are
therefore likely to affect the α-decay rate. So far, this fact has not
been considered. Here the author formulates a theory of α-decay in which
the effect of superconduction-type pair correlations is accounted for.
Such pair correlation leads to α-particle formation from pairs that are in
many states above and below the K level. This leads to an increase in
α-decay probability and to a reduction in the variation of α-particle
production probability in the individual nuclei. Moreover, such pair
correlation has a considerable effect on the coefficients of forbiddenness
in unfavorable α-decay events and in α-transitions on two-quasiparticle
levels of even-even nuclei. The agreement of theory and experimental data

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AM1037192   BOOK EXPLOITATION   S/

Solov'yev, Vadim Georgiyevich

Effect of superconducting-type paired correlations on the properties of atomic
    nuclei (Vliyaniye parny*kh korrelyatsiy sverkhprovodyashchego tipa na svoystva
    atomny*kh yader), Moscow, Gosatomizdat, 1963, 74 p. illus., biblio. 2,050
    copies printed.

TOPIC TAGS: physics, superconductivity, neuclon paired correlation, atomic nuclei,
superfluidity, Hartree-Fok method

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AM4037192

SUB CODE: GP   SUBMITTED: 06Sep63   NR REF SOV: 021

OTHER: 013   DATE ACQ: 20Mar64

Card 2/2

L 17857-63   EWT(m)/BDS   AFFTC/ASD   S/0043/63/027/007/0378/0890

ACCESSION NR: AP3003690

AUTHOR: Volkov, M.K.; Pavlikovski, A; Rybarska, V.; Solov'yev, V.G.

TITLE: Accuracy of superfluid model calculations of the properties
of strongly deformed nuclei/Report of the Thirteenth   Annual Conference held on
Nuclear Spectroscopy held in Kiev from 25 January to 2 February 1963/

SOURCE: AN SSSR, Izv.Seriya fizicheskaya, v.27, no.7, 1963, 878-890

TOPIC TAGS: nuclear level , Bogolyubov method, superfluid nuclear model

ABSTRACT: During the past few years one of the authors (V.G.Solov'yev) alone and
in collaboration with others (numerous citations) published calculations of the
characteristics and behavior of levels in odd nuclei, energies of two-quasi-parti-
cle states in even-even nuclei and the influence of pairing correlations on transi-
tion probabilities in strongly deformed nuclei in the mass number regions from 152
to 188 and 225 to 225. Despite the fact that generally good agreement was obtained
with experimental data, the accuracy of the calculations stands in need of checking
in view of the fact that certain approximations were involved. In the present pa-
per the authors investigate the accuracy of the mathematical method based on the
Bogolyubov canonical transformation, which was used for calculating the energies

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of single-quasi-particle excited states of systems with an odd number of nucleons,
the energies of two-quasi-particle states of systems consisting of an even number
of nucleons, and the corrections connected with superfluidity of the ground and ex-
cited states to be applied to calculated transition probabilities, that are used to
evaluate ft values for β-transition, forbiddenness factor in α-decays, etc. The
various approximations are discussed and some precise and approximate calculations
are compared. It is concluded that the accuracy of calculations based on the sup-
erfluid nuclear model is limited mainly by inadequate knowledge of the levels in
the "average" field and their fluctuation, and not by the mathematical formalism.
It is estimated that the error in the calculation of the energies of two-quasi-par-
ticle levels amounts to 10-20%; the error in calculating the corrections to α, β
and γ transition probabilities varies in the range from 10 to 100%. "In conclusion
we express our deep gratitude to N.N.Bogolyubov, I.N.Mikhaylov and N.I.Pyatov for
valuable discussions and to N.A.Buzdavina, I.N.Kukhtina and R.N.Fedorova for numer-
ical computations." Orig.art.has: 8 formulas, 5 figures and 5 tables.

ASSOCIATION: Joint Institute for Nuclear Studies.

Card 2/3

SOLOV'YEV, V. G.

"Properties of Ground and Excited States of Even-Even Strongly Deformed Nuclei. (Survey Paper Concerning Superfluidity)"

report submitted for All-Union Conf on Nuclear Spectroscopy, Tbilisi, 14-22 Feb 64.

XX. ., h.i.; GAI.IKO, I.G.; [author, I...][Translator]

Energies of the excited states of some even strongly deformed nuclei in the range $164 \leq A < 190$. Dubna, Ob"edinennyi in-t iadernykh issledovanii. 1962. 22 p.

PYATOV, N.I.; SOLOV'YEV, V.G.

Two-quasi-particle levels and the probabilities of β-transitions in Sm, Gd, and Dy isotopes. Izv. AN SSSR. Ser. fiz. 28 no.1: 10-17 Ja '64.   (MIRA 17:1)

1. Ob"yedinennyy institut yadernykh issledovaniy.

LYU YUAN' [Liu Yuan]; SOLOV'YEV, V.G., KORNEYCHUK, A.A.

Energy of the quadrupole states of strongly deformed even-
even nuclei. Zhur. eksp. i teor. fiz. 47 no.1:252-261 Jl '64.
                                                (MIRA 17:9)

1. Ob"yedinennyy institut yadernykh issledovaniy.

DEPARTMENT   , .../TEL, V.G.

An ... ... l ..ing ....ry of the last two neutrons in the region
N = K.. ... ...3 .T. 145.

(MIRA 18:8)

1. Ob"yedinennyy institut yadernykh issledovaniy.

24937

S/188/61/000/004/003/003
B111/B209

24.2200

AUTHORS: Pil'shchikov, A. I., Solov'yev, V. I.

TITLE: Measurement of the magnetic permeability tensor of ferrites

PERIODICAL: Moskovkiy Universitet. Vestnik. Seriya III. Fizika,
              astronomiya, no. 4, 1961, 53-58

TEXT: The dependence of the components of the magnetic permeability tensor
of ferrites on the strength of a magnetic field has been studied. The
variation of the imaginary parts of permeability was found to be anomalous
in strong fields. It is shown that it is necessary to alter the coupling
constant between measuring resonator and channel. The measurements of
permeability were made at magnetic field strengths that are far from the
range of ferromagnetic resonance. The technique used by the authors is
described by V. N. Vasil'yev in Ref. 5 (Radiotekhnika i elektronika, $\underline{1}$, 11,
1444, 1956). The formulas were obtained from an approximative solution as
described in Ref. 6 (Mikayelyan, A. L., Pistol'kors, A. A., Radiotekhnika,
$\underline{10}$, no. 3, 14, 1955). This approximative solution can be obtained on the
following assumptions: 1) $\mu'' \ll \mu'$, $\mu''_{\perp} \ll \mu'_{\perp}$, $\varepsilon'' \ll \varepsilon'$, i.e. at low electric

Card 1/6

24937

S/186/61/000/004/003/003
B111/B209

Measurement of the magnetic ...

and magnetic loss, 2) using a thin ferrite plate $(\lambda \approx 3\ cm)$ one should observe that $t_1 \leqslant 1\ mm$ and $\frac{\varepsilon'\mu_1}{\varepsilon_0\mu_0} \leqslant 10$, 3) low gyrotropicity $\left|\frac{k'}{\mu'}\right| < 0.5$, where ε', μ', k', μ_1' denote the real portions, ε'', μ'', k'', μ_1'' the imaginary portions, $\mu_1 = \frac{\mu^2 - k^2}{\mu}$, $\mu = \mu_{xx} = \mu_{yy}$, and $ik = \mu_{yx} = -\mu_{xy}$. The real and the imaginary portions are determined from the frequency and Q of the measuring resonators. The FM oscillations had a wavelength of about 3 cm, the Q of the ferrite resonator was never below 1,000 and was determined with a margin of error of 1 - 2%. In their investigations, the authors used resonators H_{104} and H_{105} modes and a Q of 5,000. Figs. 2 and 3 illustrate the dependence of μ' and μ'' on the field strength. Pistol'kors, A. A. and Marshak, M. L. (Ref. 8: Izv. vyssh. uch. zaved. radiotekhnika, 5, 594; 6, 731, 1958) showed in their study of the propagation of electromagnetic waves in a waveguide with a ferrite plate that higher modes may be disregarded when $\left|\frac{k'}{\mu'}\right| < 0.4$. V. N. Vasil'yev's method was found to be applicable for fields stronger than the resonance field. When the low gyrotropicity

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. 24937

S/188/61/000/004/003/003
3111/0209

Measurement of the magnetic ...

$(\left|\frac{k'}{\mu'}\right| < 0.4)$ is violated in strong fields, the imaginary portions (μ'') are found to vary anomalously, which is probably caused by the influence of higher modes. It is further shown that the coupling constants between resonator and channel vary with the constant magnetic field. Within the accuracy of measurement, ε was assumed to be constant at $H = 0$ and at $H_{max} = 13500$ oersteds, with the exception of ferrite specimen no. 4.

There are 4 figures, 1 table, and 8 references: 5 Soviet-bloc and 3 non-Soviet-bloc.

ASSOCIATION: Kafedra radiotekhniki (Department of Radio Engineering)

SUBMITTED: October 18, 1960

Card 3/6

30066
S/048/61/025/011/011/031
B104/B102

Effect of induced anisotropy...

with a purity of 99.995%, the said rise cannot be attributed to rare-earth impurites. Present results show that the induced anisotropy of polycrystal-line yttrium garnet is due to Fe^{2+} ions. To clarify the establishment of induced anisotropy with time, the authors determined the time dependence of $|\Gamma|$ when the specimens were rotated through $90°$ within ~0.1 sec. $|\Gamma|$ did not change noticeably above $130°K$. At lower temperatures, $|\Gamma|$ changed abruptly during rotation, and then returned to its original value (Fig. 4). Sign and amplitude of the jump were found to depend on the constant field H_0.

It is believed that induced anisotropy is not yet fully established immedi-ately after rotation through $90°$ and that the resonance curve at a given temperature shifts by H_c toward stronger fields relative to the static curve. H_c ~ 350 oersteds is obtained at $77°K$, and H_c ~ 200 oersteds at $90°K$. It follows from a discussion of this result that in addition to the processes that are observed after rotation, also other processes take place which have time constants considerably smaller than the time of rotations. These processes are held responsible for the major part of the induced anisotropy field. As is shown, a superposition of several processes with different time constants and activation energies of the order of 0.05 ev

Card 2/4/3

L 18115-63   EWP(q)/EWT(m)/BDS   AFFTC/ASD   JD/JG
ACCESSION NR: AP3003908   S/0181/63/005/007/2019/2021

AUTHORS: Gurevich, A. G.; Solov'yev, V. I.

TITLE: Fine structure of angular dependence on width of resonance curve for
yttrium garnet with terbium impurities

SOURCE: Fizika tverdogo tela, v. 5, no. 7, 1963, 2019-2021

TOPIC TAGS: fine structure, resonance curve, garnet, Y, Tb, rare earth , energy
level, resonance field, impurity ion, exchange field, anisotropy, crystal,
ferromagnetic resonance

ABSTRACT: The authors have investigated crystals of yttrium garnet with 0.01%
Tb (molar percent relative to Y content) from the same collection used in the
work of A. G. Gurevich, Meng Hsien-chen, and S. S. Starobinets (FTT, 5, 740, 1963).
The samples were prepared in the form of small spheres about 0.5 mm in diameter,
polished with an abrasive powder having a grain size of 1μ. Measurements were
made on a 3.5-cm wave at 4.2K. The angular dependence investigated was for the
angle in the (110) plane between the direction of magnetic field and the [100]
axis (measured with a precision of $\sim 0.3°$). Maximums for the resonance field

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L 18115-63
ACCESSION NR: AP3003908

2.

were found at angles of 19, 36, and 79°, agreeing with the results of J. F. Dillon and L. R. Walker (Phys. Rev., 124, 1401, 1961). Maximums of fine structure were found at several angles: 72, 77, and 81° in the 70-85° absorption band. These may be related to the three energy levels of the Tb^{3+} ion. Correlation for other absorption bands is not as good. The authors note that during the experimental study of ferromagnetic resonance in single crystals containing rare-earth impurities and other "fast-relaxation" ions, it was necessary to focus more attention on anisotropy in the width of the resonance curve. A very urgent problem is the development of a theory on the width of resonance curves corresponding to fast-relaxation impurities, a theory that will permit the use of experimental data on anisotropy for determining the pattern of energy levels for impurity ions in crystals and exchange fields. "The authors express their thanks to A. I. Yakovlev for his aid in making the measurements." Orig. art. has: 1 figure.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semi-conductors, Academy of Sciences, SSSR)

SUBMITTED: 08Mar63   DATE ACQ: 15Aug63   ENCL: 00

SUB CODE: PH   NO REF SOV: 003   OTHER: 003

Card 2/2

ACCESSION NR: AP4013516   s/0181/64/006/002/0515/0520

AUTHOR: Solov'yev, V. I.

TITLE: The effect of impurities of the positive ferrous ion on ferromagnetic resonance in polycrystalline yttrium ferrites

SOURCE: Fizika tvordogo tela, v. 6, no. 2, 1964, 515-520

TOPIC TAGS: ferrite, doping, magnetic field, induced anisotropy, ferromagnetic resonance

ABSTRACT: Experiments show a diminution of the resonance field at low temperature. This effect is associated with the appearance of a field of induced anisotropy (with uniaxial symmetry). The processes determining the appearance of this induced anisotropy in yttrium ferrites doped with Fe^{2+} have not yet been completely explained. It is stated that when an external magnetic field is applied electron exchange occurs between Fe^{3+} and Fe^{2+} ions, resulting in a distribution of Fe^{2+} ions that corresponds to a minimum of free energy. Another possible cause of the induced anisotropy is deformation of the electron cloud of the Fe^{2+} ion by the

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ACCESSION NR: AP4013516

external magnetic field. Complete understanding of this problem requires further
experimental studies on single crystals of yttrium garnet containing quantities
of Fe^{2+}. "The author expresses his thanks to A. G. Gurevich for his interest in
the work and for valuable advice, to A. I. Pil'shchikov and Yu. V. Bogomolov for
very useful discussion on questions touching the work, and to Ye. S. Shar for
preparing the samples." Orig. art. has: 7 figures.

ASSOCIATION: none

SUBMITTED: 07Sep63

SUB CODE: EC

DATE ACQ: 03Mar64

NO REF SOV: 007

ENCL: 00

OTHER: 008

Card 2/2

ACCESSION NR: AP4043385   S/0181/64/006/008/2524/2526

AUTHOR: Solov'yev, V. I.

TITLE: Temperature dependence of width of resonance curve of
Mn-Ferrite

SOURCE: Fizika tverdogo tela, v. 6, no. 8, 1964, 2524-2526

TOPIC TAGS: manganese ferrite, temperature dependence, resonance
curve, single crystal, spin lattice relaxation

ABSTRACT: Results are presented of the measurement of the dependence
of the width of the resonance curve on the temperature for a single
crystal manganese ferrite with composition $Mn_{1.03}Fe_{1.95}O_4$, in the
form of a sphere ~0.6 mm in diameter. The measurements were made
at 3.2 cm wavelength in a rectangular cavity operating in the TE_{103}
mode and placed in liquid helium. The temperature variation of the

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ACCESSION NR: AP4043385

width of the resonance curve was plotted while the helium boiled out, and the levels at which the width was determined were calculated by a procedure described elsewhere by A. G. Gurevich et al. (Zav. lab. v. 28, 189, 1962).   An analysis of the results suggests that the observed low-temperature maximum of the resonant width is connected not with the Fe^{2+} ions but with Mn^{3+} ions, or perhaps manganese ions with higher valence.   However, the experimental data on the spin-lattice relaxation time of paramagnetic compounds of Mn^{3+} are insufficient for a final conclusion.   "The author thanks A. G. Gurevich and A. I. Pil'shchikov for a discussion of the results and for valuable advice, and A. I. Yakovlev for help with the measurements." Orig. art. has: 1 figure.

ASSOCIATION: None

SUBMITTED: 29Feb64   ENCL: 01

SUB CODE: SS   NR REF SOV: 003   OTHER: 012

Card   2/3

ACCESSION NR: AP4043385

ENCLOSURE: 01

Temperature dependences of H_{res} (1, 2) and $2\Delta H$ (3, 4) for a sphere made of single-crystal Mn-ferrite
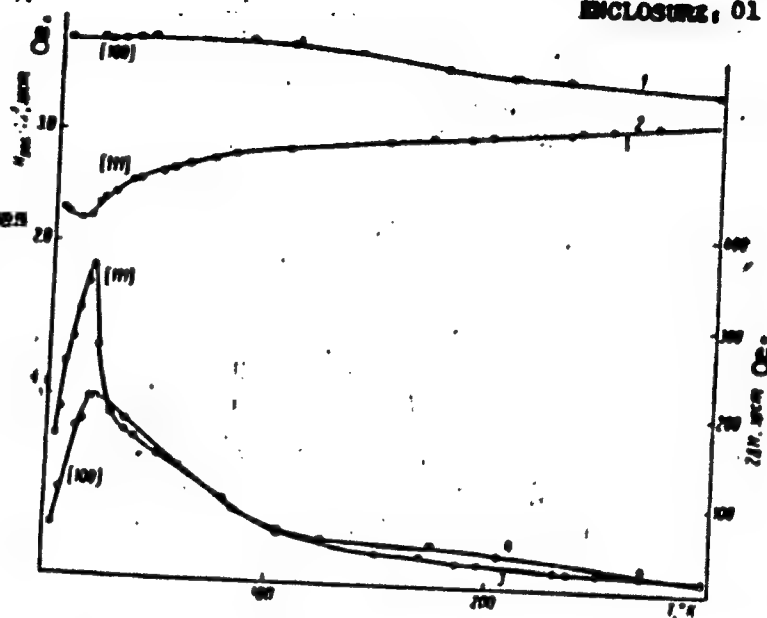
Card: 3/3

ACCESSION NR: AP4023391   S/0048/64/028/003/0462/0469

AUTHOR: Gurevich,A.G.; Meg,Hsien-chen; Starobinets,S.S.; Solov'yev,V.I.; Myel'nikova, I.Ye.

TITLE: Anisotropy of the resonance curve width in yttrium garnet doped with rare earth elements /Report, Symposium on Ferromagnetism and Ferroelectricity held in Leningrad 30 May - 5 June 1963/

SOURCE: AN SSSR. Izvestiya, Seriya fizicheskaya, v.28, no.3, 1964, 462-469

TOPIC TAGS: spin wave, spin wave resonance, resonance curve, resonance curve width, resonance curve anisotropy, yttrium garnet, doped yttrium garnet

ABSTRACT: Perfect yttrium garnet single crystals are ideal for investigating various effects involved in ferromagnetic resonance. By doping the crystals with different ions - specifically, rare earth ions - the anisotropy and relaxation produced by such ions can be observed in pure form. In the present work there were carried out resonance measurements with doped yttrium garnet single crystals grown from a molten solution by the Nielsen-Dearborn (J.Phys.Chem.Solids,5,202,1958) technique. The initial yttrium oxide was 99.9995% pure; the purity of the rare

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ACCESSION NR: AP4023391

earth oxides was better than 99.99%. The specimens were ground to spherical shape by the air spinning procedure of I.Ye.Gubler (Pribory* i tekhnika eksperimenta,No. 5,145,1960) and polished with fine-grain abrasive. The measurements were performed in the 3-cm range with the specimens located in the antinode of the magnetic field in TE_{10n} rectangular cavities. For the measurements in the 4.2 to 78°K range the reflection cavity was immersed in liquid helium and the measurements were made at 4.2°K and during the temperature rise after evaporation of the helium. The measurements at 78° and higher were carried out by the procedure described earlier (Fiz. tverdogo tela,5,740,1963; Pribory* i tekhnika eksp.,No.1,73,1963). The width of the spin-wave resonance curve was determined by measuring the spin wave excitation threshold with longitudinal pumping, as described by E.Schloemann,J.Green and U. Milano (J.Appl.Phys.,31,No.5,Suppl.386S,1960). The pulse duration was 3 microsec. The experimental results are presented in the form of a series   giving the angle dependences of $2\Delta H$ and H_{res} for different specimens as well as the temperature dependence for yttrium garnet with 0.01% Tb. The $2\Delta H$ curves exhibit structure. The principal conclusions are: 1. At temperatures above the point of the temperature maximum of $2\Delta H$ there obtain in rare earth doped yttrium garnet angular $2\Delta H$ minima at angles corresponding to closer approach to the energy levels of the rare earth

Card $^{2/3}$

ACCESSION NR: AP4023391

ions. 2. The angular maxima of $2\Delta H$ in yttrium garnet at low temperatures exhibit fine structure at least in the case of some rare earth impurities. 3. The anisotropy of the spin wave resonance curve width, due to rare earth ions, does not depend significantly on the wavenumber. Orig.art.has: 9 figures.

ASSOCIATION: none

SUBMITTED: 00   DATE ACQ: 10Apr64   ENCL: 00

SUB CODE: PH   NR REF SOV: 006   OTHER: 010

Card 3/3

L 2200-66   EWT(1)/EWT(m)/EPF(c)/ETC/EWG(m)/EWP(t)/EWP(b)   IJP(c)   HDW/JD/AW/

GG

ACCESSION NR: AP5014577   UR/0181/65/007/006/1761/1769

AUTHOR: Solov'yev, V. I., Gurevich, A. G.

TITLE: Ferromagnetic resonance in a terbium-doped yttrium garnet

SOURCE: Fizika tverdogo tela, v. 7, no. 6, 1965, 1761-1769

TOPIC TAGS: yttrium compound, garnet, ferromagnetic resonance, temperature
dependence, angular distribution, line splitting, paramagnetic relaxation

ABSTRACT: This is a continuation of earlier work on ferromagnetic resonance
(FTT v. 5, 2019, 1963), where a "fine structure" of the absorption bands was
observed, and of an earlier study (Izv. AN SSSR ser. fiz. v. 28, 462, 1964),
where a temperature dependence of the width of the resonance curve was ob-
served. To explain these phenomena, the authors extended their earlier
measurements to a broader temperature range, to different frequencies, and
to more carefully oriented samples. The measurements were made in single
crystals of yttrium ferrite with small amounts of terbium added, in the

Card   1/2

L 2200-66

ACCESSION NR: AP5014577

frequency bands near 9300 and 4500 Mc. At low temperature, the angle-dependent resonance absorption bands caused by the coming together of the energy levels of the terbium ions split into two peaks. At the angles corresponding to the absorption bands, the temperature dependence of the width of the resonance curve is characterized by two maxima. These features of the ferromagnetic resonance are explained on the basis of the theory of the "slow relaxation" mechanism. The results confirm the existence of two temperature maxima and the previously observed fine structure, which are shown to decrease a lower temperature but to remain constant in frequency. It is demonstrated that the second maximum cannot be due to fast relaxation. "The authors thank A. I. Pil'shchikov, M. I. Klinger, and A. N. Ageyev for a discussion of the results and advice and Ye. V. Kolontsova, for help with the orientation of the crystals." Orig. art. has: 4 formulas and 6 figures.

ASSOCIATION: Radiotekhnicheskiy institut AN SSSR, Moscow (Radiotechnical Institute, AN SSSR); Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors, AN SSSR)

SUBMITTED: 28Dec64   ENCL: 00   SUB CODE: SS

NR REF SOV: 007   OTHER: 009

Card   2/2

_____, A. D.; SKVORTSOV, V. I.

"Modification de la définition de l'echelle de température
sur la méthode de la frequence quadrupolaire nucleaire "
Report presented at the 6th Session of the Advisory Committee
on Thermometry to the International Committee on Weights and
Measure ", Sevres, France, 25-27 Sep 62

Institut de métrologie ". I. Mendeleev (". R. S. S.)

AUTHORS: Solov'yev, V.I., Brodskiy, A.D.

TITLE: An apparatus for measuring temperature by means of
            nuclear quadrupole resonance

PERIODICAL: Pribory i tekhnika eksperimenta, no.2, 1962, 111-114

TEXT: The described apparatus ЭТ-2 (ET-2) is used for
temperature measurements at and above 77°K.   It makes use of the
dependence of nuclear quadrupole resonance (N.Q.R.) frequency on
temperature.   The basic equation for the interaction of the
quadrupole moment of the nucleus with the internal fields in a
crystal is given in the form of a Hamiltonian and from this is
derived an expression for the temperature dependence of the N.Q.R.
frequency.   However, the theory is not adequate to provide an
absolute measure of temperature and the apparatus was calibrated
by means of a series of fixed points.   In order to obtain a fast
and simple means of measuring the N Q.R. frequency, a special
phase compensated radio-spectrometer circuit was developed, the
circuit of which is described in detail.   The essence of the
phase compensation method is the production of an auxiliary (null)
Card 1/2

S/120/62/000/002/026/047
E039/E435

An apparatus for measuring ...

impulse when the frequency of the signal in the circuit containing
the sample corresponds with the frequency of a standard generator.
Coincidence is obtained by changing the frequency of the standard
generator.   The error in comparative measurements is not more than
1 to 2 c/s.   In the case of a thermometric substance with a
temperature coefficient of N.Q.R. $\sim$ 3 to 4 Kc/°K (e.g. $KClO_3$)
the error in temperature measurement is $\pm$ 0.001°K.   A block
diagram of the apparatus together with essential circuits is given.
The scanning head and resonator probe are also illustrated.   With
the aid of this apparatus an investigation of thermometric
materials containing chlorine was conducted (e.g. $NaClO_3$, $KClO_3$,
$SbCl_3$, paradichlorbenzene, etc).   A graph showing the temperature
dependence of the N.Q.R. frequency for $NaClO_3$ and paradichlor-
benzene is given.   At 198°K the N.Q.R. frequencies are about
30.280 and 34.530 Mc/s respectively and at 294°K, 29.300 and
34.270 Mc/s.   There are 7 figures.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut
             metrologii (All-Union Scientific Research Institute of
                                                      Metrology)

SUBMITTED: June 26, 1961
Card 2/2

BRODSKIY, A.D.; SOLOV'YEV, V.I.

Establishing reference points of a temperature scale by the
method of nuclear quadrupole resonance. Izm.tekh. no.9:39-40
S '62.   (MIRA 15:11)
                              (Thermometry)
                 (Nuclear magnetic resonance and relaxation)

S/589/62/000/063/021/021
E202/E492

AUTHORS: Brodskiy, A.D., Solov'yev, V.I.

TITLE: On the reproducibility of a temperature scale based
             on the nuclear quadrupole resonance

SOURCE: USSR. Komitet standartov, mer i izmeritel'nykh
             priborov. Trudy institutov Komiteta. no.63(123).
             Moscow, 1962. Issledovaniya v oblasti teplovykh i
             temperaturnykh izmereniy, 230-234

TEXT: The possibility of reproducing temperature scale by means
of a standard thermometer based on the temperature dependence of
the resonance frequency of a pure nuclear quadrupole splitting of
levels is briefly described.   The work was carried out in the
Laboratoriya nizkikh temperatur (Low Temperature Laboratories)
of VNIIM in 1960 and led to the development of a special
radiospectrometer.   The authors give the fundamental relations
on which the action of the nuclear quadrupole resonance
thermometer depends and discuss the merits of the super-
regenerative oscillator-detector and the regenerative
oscillator-detector.   It is concluded from the authors own and
other work that these relations may give high sensitivity in the
Card 1/2

On the reproducibility ...

S/589/62/000/063/021/021
E202/E492

region $20 < T < 300°K$, namely $0.002°$ at $273°K$ and $0.004°$ at $77°K$.
Using the super-regenerative and regenerative circuits in their
radiospectrometers, the authors carried out preliminary studies
with paradichlorobenzol, sodium chlorate and potassium chlorate
as thermometric substances in the region of 198 to 294°K.
There are 2 figures.

ASSOCIATION: VNIIM

SUBMITTED: January 26, 1961

Card 2/2

L 06981-67   EWT(m)/EWP(t)/ETI   JD/WH/JG/JR

ACC NR: AP6018357   (A)   SOURCE CODE: UR/0089/66/020/005/0426/0427

AUTHOR: Dubrovskiy, V. B.; Ryabukhin, Yu. S.; Mirenkov, A. F.; Solov'yev, V. N.

ORG: none

TITLE: Passage of gamma radiation through seams of assembled concrete shields

SOURCE: Atomnaya energiya, v. 20, no. 5, 1966, 426-427

TOPIC TAGS: reactor shielding, gamma radiation, radiation dosimetry/SBM-10 gamma counter

ABSTRACT: This is an abstract of article no. 81/3550, submitted to the editor and filed, but not published in full. In view of lack of data on the shielding pro-portios of assembled shields, and in view of the lack of well founded methods of calculating the passage of gamma rays through screens, the authors propose as a basic criterion for estimating the shielding efficiency a coefficient equal to the ratio of the integral or maximal dose intensities behind the assembled screen and an equivalent monolithic shield. An expression is proposed for this coeffi-cient and its validity was tested with a cobalt source of activity 500 gram equiva-lent of radium in two source geometries (collimated and isotropic source. The

Card 1/2   UDC: 621.039.538.7

C. A
.951

A new method for determining the degree of freshness of meat. V. Sukyr'ev and V. Piul'skaya. *Myasnaya Ind. S.S.S.R.* **22**, No. 3, 18-20(1951).— The method is based on the intensity of a color reaction obtained from the PH_3 released from meat. Dissolve 20 g. KI and 130 g. $CdSO_4$ in 850 cc. H_2O, evap. to dryness, ext. with alc., filter, and dry to prep. CdI_2. Dissolve 2.5 g. of HgI_2 in 100 cc. H_2O, and add 2.5 g. of CdI_2. Soak filter paper in this $CdHgI_4$ soln., dry 30 min. at 80°, cut to strips 0.5 × 8 cm., and store in a closed container over $CaCl_2$. In the test a strip of the test paper wetted with 1-2 drops of Ac_2O is suspended in a corked 100-cc. Erlenmeyer flask contg. a 20-25-g. meat sample. A rubber stopper should not be used. The test paper should not be against the wall or bottom, or be in contact with the meat. After standing immobile for 10 min. at room temp. the test paper is observed for development of yellow to orange color. The results of this test are compared with pH and tests for NH_3, H_2S, and bacterial count.

M. M. Piskur

CA

New data on ripening meat. V. Solov'ev and V. Plʹ'-
shaya. Myasnaya Ind. S.S.S.R. 22, No. 4, 76-81(1961).—
The tests were made throughout a 144-hr. post-mortem
storage period at 0-4° on the meat of cows 6-8 yrs. old.
After death the drop in acty. of actomyosin (I) ceased at 24
hrs.; after which it gradually increased with time at a rate
slower than the original drop in acty. The adenosinetri-
phosphoric acid was destroyed; at 12 hrs. destruction was
greater than 90% of the original present in the fresh meat.
Cooled meat retained a fraction of its easily hydrolysed P;
at 60 hrs.' storage some increase was observed. During the
first stages of ripening of meat the activity of I gradually
increased from 6% at 12 hrs. to 80% at 48 hrs. Some
lowering of I activity occurred during resolution of rigor.
An increase of I activity after period of rigor could possibly
be explained on the basis of release of actin from muscle
structure and formation of complex highly active I. During

the fall of free-glycogen content of meat there was also a
decrease in difficultly extractable glycogen. There was no
relationship between change in difficultly extractable glyco-
gen, the acty. of I, and the consistency of meat. In
rapidly cooled samples there existed a higher pH and a
somewhat lesser development of lactic acid during ripening.
A significant delay of conversion of I into the insol. state
occurred during the first 6 hrs. post-mortem.

M. M. Pisker

PAL'MIN, V. SOLOV'YEV, V. SHIROKOV, N.

MEAT

"Practical handbook on biochemistry of meat." by Prof. N. S. Drozdov. Reviewed by V. Pal'min, V. Solov'yev, N. Shirokov. Mias. ind. SSSR 23 no. 3 (1952)

9. Monthly List of Russian Accessions, Library of Congress, September 1952, Uncl.

SOLOV'YEV, V., kandidat khimicheskikh nauk.;RUBASHKINA, S., inzhener.

Determining the peroxide number of fat contained in meat and
meat products. Mias. ind. SSSR no.2:41-42 '57.   (MLRA 10:5)
        (Meat--Analysis) (Peroxides) (Oil and fats--Analysis)

USSR / Farm Animals.   Cattle.   Q-2

Abs Jour: Ref Zhur-Biol., No 12, 1958, 54771.

Author   : Mozgovaya, R.P., Solov'yev, V.I., Sadovnikova,
           N.V., Ivanova, A.A.
Inst   : Not given.
Title   : The Use of Diethylstilbestrol in the Fattening of
           Cattle and the Method for the Determination of
           Its Content in the Meat.

Orig Pub: Doklady VASKhNIL, 1957, No 8, 8-12.

Abstract: The fattening of cattle on distillers' solubles
          and beet pulp, with the addition of 7-10 mg. of
          diethylstilbestrol daily, per head, showed that
          the weight gain increases by 12-16% and feed ex-
          pense decreases by 11-14%; the slaughter output
          of meat and raw fat augments by 5%. A modified
          technique for the determination of the content of
          diethylstilbesterol in the meat is described.

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33

SOLOV'YEV, V., kandidat khimicheskikh nauk; RUBASHKIN, S., inzhener.

Standards for sausage need to be revised. Mias.ind.SSSR 28
no.4:29-30 '57. (MLRA 10:7)
(Sausages)

SOLOV'YEV, V., kand. khim. nauk; RUBASHKINA, S., starshiy nauchnyy sotrudnik.

Biological changes in beef during its curing in brine. Mias. ind.
SSSR 28 no.6:48-49 '57. (MIRA 11:1)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut myasnoy promyshlen-
nosti.

(Beef) (Sausages)

SOLOV'YEV, V., kand.khim.nauk

      Consultation. Mias. ind. SSSR 29 no.5:55 '58. (MIRA 11:10)
                  (Horse meat)

VOLOVINSKAYA , V.P., kand.tekhn.nauk; SOLOV'YEV, V.I., kand.khim.nauk;
RUBASHKINA, S.Sh., starshiy nauchnyy sotrudnik; KRYLOVA, V.V.,
mladshiy nauchnyy sotrudnik.

Intensification of the method of aging meat in brine for producing
semismoked sausages. Trudy VNIIMP no.9:40—49 '59.   (MIRA 13:8)
        (Sausages)

SHISHKINA, N.N., kand.tekhn.nauk; SOLOV'YEV, V.I., kand.khimicheskikh nauk
     KURKO, V.I., kand.tekhn.nauk; DUBROVINA, L.I., mladshiy nauchnyy
     sotrudnik; SHCHEGOLEVA, O.P., mladshiy nauchnyy sotrudnik.

     Intensified coloration of sausages cooked in an alternating
     electric field of high frequency, and the frying of sausages
     with the use of smoke solutions. Trudy VNIIMP no.9:50-62
     '59.   (MIRA 13:8)
                    (Sausages)

SOLOV'YEV, V.I., kand.khimicheskikh nauk; SMELOVA, Z.A., mladshiy
    nauchnyy sotrudnik

    Taste and flavor of food protein hydrolyzates. Trudy VNIIMP
    no.9:95-103 '59.   (MIRA 13:8)
            (Food--Analysis)   (Proteins)

LADEN..., ..., kand. tekh. nauk; KUKHAREVA, I.I., starshiy nauchnyy sotrudnik; SOLOV'YEV, V.I., kand. khim. nauk; IL'YASHENKO, N.A., kand. veterin. nauk; ZEVIOVA, V.V., starshiy nauchnyy sotrudnik; VOLKOVA, A.G., mladshiy nauchnyy sotrudnik; KUZNETSOVA, G.N., mladshiy nauchnyy sotrudnik; POLITAYEV, T.N., mladshiy nauchnyy sotrudnik

Intensification of technological processes in the production of hard smoked sausages. Trudy VNIIMP no.11:57-75 '62.

(MIRA 18:2)

SOLOV'YEV, V.I., kand.khim. nauk; ADUTSKEVICH, V.A., kand.vetor. nauk;
     KUZNETSOVA, G.N., starshiy nauchnyy sotrudnik; VOLKOVA, A.G.,
     starshiy nauchnyy sotrudnik; SHCHEGOLEVA, O.P., inzhener-khimik;
     AGAPOVA, Z.A., mladshiy nauchayy sotrudnik; AGLITSKAYA, A.V.,
     mladshiy nauchayy sotrudnik; KRAKOVA, V.Z., mladshiy nauchayy
     sotrudnik

     Investigations in the field of meat aging. Trudy VNIIMP no.14:
     20-35 '62.   (MIRA 16:8)
                              (Meat—Analysis)

SOLOV'YEV, V. I.; VOLKOVA, A. G.; KUZNETSOVA, G. N.; GLAZOVA, N. G.

"Biochemical changes observed during storage of quickly refrigerated beef meat."

report submitted for 10th European Mtg, Meat Res Workers, Rockilde, Denmark, 7-15 Aug 1964.

KUKHARKOVA, L.L., starshiy nauchnyy sotrudnik; LAVROVA, L.P., kand.
    tekhn. nauk; SOLOV'IEV, V.I., kand. khim. nauk; FREYDLIN, Ye.M.,
    kand. veter. nauk; PEROVA, P.V., kand. veter. nauk; SADIKOVA, I.A.,
    kand. biol. nauk; KRYLOVA, V.V., starshiy nauchnyy sotrudnik;
    BUSHKOVA, L.A., starshiy nauchnyy sotrudnik; RYNDINA, V.P.,
    starshiy nauchnyy sotrudnik; TRUDOLYUBOVA, G.B., starshiy
    nauchnyy sotrudnik; KARGAL'TSEV, I.I., assistent; MIKHAYLOVA,
    A.Ye., mladshiy nauchnyy sotrudnik; KARPOVA, V.I., mladshiy
    nauchnyy sotrudnik; POLETAYEV, T.N., mladshiy nauchnyy sotrudnik;
    MERKULOVA, V.K., mladshiy nauchnyy sotrudnik

Directed use of microorganisms for the improvement of the
quality of sausage products. Report No. 1. Trudy VNIIMP no.16:
64-75 '64.   (MIRA 18:11)

1. Kafedra tekhnologii Moskovskogo tekhnologicheskogo instituta
myasnoy i molochnoy promyshlennosti (for Kargal'tsev).

SOLOV'YEV, V.I., kand. khim. nauk; KUZNETSOVA, G.N., starshiy
nauchnyy sotrudnik

Studying the lability of the basic substance of intramuscular
connective tissues during meat storage at low above zero
temperatures. Trudy VNIIMP no.16:110-118 '64.

(MIRA 18:11)

SOLOV'YEV, V.I., kand. khim. nauk; SHCHEGOLEVA, O.P., ispolnyayushchiy
obyazannosti inzhenera-khimika

Changes in the protein system of meat during its aging. Report No.1.
Trudy VNIIMP no.16:119-155 '64.   (MIRA 18:11)

SOLOV'YEV, V.I., kand. khim. nauk; LAVROVA, L.P., kand. tekhn. nauk;
SADIKOVA, I.A., kand. biol. nauk; KRYLOVA, V.V., starshiy
nauchnyy sotrudnik; BUSHKOVA, L.A., starshiy nauchnyy sotrudnik;
MERKULOVA, V.K., mladshiy nauchnyy sotrudnik; POLTAYEV, T.N.,
mladshiy nauchnyy sotrudnik; KARPOVA, V.P., inzh.-khimik;
MAMAYEVA, S.A., tekhnik

Studying some conditions providing for color intensity and
stability in the production of smoked and cooked sausage.
Trudy VNIIMP no.16:183-201 '64.   (MIRA 18:11)

SOLOV'YEV, V.I.; SHCHEGOLEVA, O.P.; AGAPOVA, Z.A.

Initial stage of proteolysis of protein fractions of myosin during the
process of meat ripening. Biokhimiia 29 no.3:393-398 My-Je '64.
(MIRA 18:4)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut myasnoy promyshlennosti,
Moskva.

KUKHARKOVA, L.L., starshiy nauchnyy sotrudnik; LAVROVA, L.P., kand.
tekhn. nauk; SOLOV'YEV, V.I., kand. khim. nauk; FREYDLIN, Ye.M.,
kand. veter. nauk; PEROVA, P.V., kand. veter. nauk; SADIKOVA,
I.A., kand. biol. nauk; KRYLOVA, V.V., starshiy nauchnyy
sotrudnik; BUSHKOVA, L.A., starshiy nauchnyy sotrudnik;
RYNDINA, V.P., starshiy nauchnyy sotrudnik

Directed use of microorganisms for the improvement of the
quality of sausage products. Report No. 2. Trudy VNIIMP no.16:
76-109 '64.   (MIRA 18:11)

SOLOV'YEV, V.I.; SOSKIN, I.M.

Determining the coefficient K during work with the electromag-
netic current meter in the Baltic Sea. Trudy GOIN no.65:154-162
'61.   (MIRA 14:8)
(Baltic Sea—Ocean currents)

SOSKIN, I.M.; KUZNETSOVA, L.N.; SOLOV'YEV, V.I.

Baltic Sea currents based on the use of the dynamic method to
process hydrological observations. Trudy GOIN no.73:76-95 '63.
(MIRA 16:7)

(Baltic Sea—Ocean currents)

i ___ 772-66   ____(m)/___/1   IJP(c)

ACC NR: AP6016380   SOURCE CODE: UR/0048/65/029/010/1876/1880

AUTHOR: Vernov, S. N.; Khristiansen, G. B.; Abrosimov, A. T.; Atrashkevich, V. B.; Belyayeva, I. F.; Kulikov, G. V.; Solov'yeva, V. I.; Fomin, Yu. A.; Khrenov, B. A.

ORG: Scientific Research Institute of Nuclear Physics, Moscow State University im. M. V. Lomonosov (Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta)

TITLE: Primary superhigh-energy cosmic radiation according to data on extensive atmospheric showers

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 29, no. 10, 1965, 1876-1880

TOPIC TAGS: cosmic radiation, muon

ABSTRACT: Of interest in the investigation of the primary energy spectrum of cosmic rays and their composition is the knowledge of the spectrum of extensive atmospheric showers (e.a.s.) with respect to the total number N_μ of high energy muons ($E_\mu \geq 10^{10}$ eV) and the distribution of e.a.s. over the total number of the particles N_0 for a given N_μ.   In this connection the authors analyze the primary energy spectrum of cosmic rays on the basis of experimental data obtained with a special device for investigating e.a.s. recorded with a probability of $W \geq 0.95$. This device makes it possible to determine the total number of charged particles in an e.a.s.

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L 25772-66

ACC NR: AP6016380

at the observation level. An averaged function $\rho_\mu(R)$ is plotted to determine the spatial distribution N_μ of the muons, and, thus, the total number of these muons is determined. The distribution of N_e for a given N_μ is evaluated on the basis of data on an e.a.s. with $N_\mu = (1-2) \cdot 10^4$. The experimental findings are found to be in satisfactory agreement with theory. Thus, on the basis of the complex whole of the experimental findings, it may be concluded that the composition of primary cosmic rays in the superhigh-energy region apparently does not significantly differ from the composition in the low-energy region, and the γ-index of the primary energy spectrum is variable rather than constant. Orig. art. has: 5 figures. [JPRS]

SUB CODE: 20, 04 / SUBM DATE: none / ORIG REF: 009 / OTH REF: 002

Card 2/2   r C

REZNICHENKO, V.A.; SOLOV'YEV, V.I.

Smelting ilmenite concentrates with addition of flux. Titan i
ego splavy no.2:29-34 '59.   (MIRA 13:6)

1. Institut metallurgii AN SSSR.
      (Titanium—Electrometallurgy) (Flux(Metallurgy))

SoLov'yev V.L.

S/180/60/000/02/028/028
E071/E135

AUTHOR: Ogurtsov, S.V.

TITLE: Scientific Conference on the Metallurgy, Chemistry and Electrochemistry of Titanium

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1960, Nr 2, pp 167-168 (USSR)

ABSTRACT: The conference took place on January 14-20 1960 in Moscow in the Institute of Metallurgy, Academy of Sciences, USSR. It was organised by the Committee for Coordination of Scientific Research on Titanium. About 400 representatives of academic and research institutions and works participated in the conference. The conference was divided into four sections: 1) raw materials and smelting of ores; 2) chemical technology and chlorination; 3) metallothermic methods of smelting titanium; and 4) electrolysis. The following papers were read:
Metallurgical evaluation of some new deposits (B.D. Dmitrovskiy); State and prospects of improving the technology of smelting of ilminite concentrates (V.A. Reznichenko and V.I. Solov'yev);

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Thermodynamic investigations of titanium compounds (F.B. Khalimov and V.A. Reznichenko); An investigation of the process of reduction of iron-titanium concentrates with carbon (M.B. Rapoport); Some hydrodynamic and kinetic features of the process of chlorination of titanium dioxide in molten chlorides (Kim Men-fin); Oxidation of titanium tetrachloride with oxygen (G.M. Kovnov, B.I. Melent'yev, V.A. Reznichenko); Utilisation of ilminite concentrates for the production of titanium dioxide pigment by the sulphuric acid method (M.I. Borodina, A.D. Zhavkevich, T.A. Gubarova); An investigation of some properties of the system $TiCl_4 - AlCl_3 - FeCl_3$ (N.K. Druzhinina); An investigation of phase equilibria liquid-vapour in systems formed by titanium tetrachloride with chloroanhydrides of mono- and trichloroacidic acids (G.V. Seryakov, S.A. Vaks, L.S. Sidorina); Determination of the summary content of carbon in titanium tetrachloride (G.V. Seryakov, S.A. Vaks, I.M. Golovanov); Basic conditions for standardised

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results of the process of production of titanium by the magnesium thermite method (S.V. Ogurtsov, V.A. Reznichenko, V.K. Ustinov, V.I. Kozhevnikov, A.I. Dedkov); On the two stage method of production of titanium by the sodium thermite method (V.A. Reznichenko, S.V. Ogurtsov); Production of a high purity titanium (V.I. Batashev); The influence of the content of chlorine in a high purity titanium sponge on the process of smelting and on the quality of the metal produced (G.M. Vaynshteyn); The production of titanium and its alloys by refining of black anodes (Academician I.P. Bardin, A.N. Pronnov, V.I. Lukashin); On the theory of refining of titanium (V.A. Kuchinskiy); Production of titanium by electrolysis of titanium dioxide in fluoride-chloride melts (I.P. Bardin, A.A. Kazayn); Electrolytic production of titanium from chloride-fluoride melts (V.M. Ioffe, V.N. Boranov, N.A. Lyubimova); Electrolytic refining of titanium waste products (V.M. Lozovatskiy); and a number of other reports.
There are no figures, tables or references.

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S/137/62/000/006/028/163
A006/A101

AUTHORS: Reznichenko, V. A., Sidorenko, G. D., Solov'yev, V. I., Karyazin,
             I. A., Dmitrevskiy, Ye. B., Afanas'yev, T. V.

TITLE: Developing electric melting techniques for perovskite-titanium-
             magnetite sinter

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 6, 1962, 13, abstract 6394
             (In collection: "Titan i yego splavy", no. 5, Moscow, AN SSSR,
             1961, 54 - 59)

TEXT: As a result of experimental industrial investigations on the elec-
tric melting of perovskite titanium-magnetite sinter, the possibility was proved
of extracting Nb into cast-iron and of obtaining titanous slag. Nb cast-iron
can be used as an initial product to obtain Nb slag which is a raw material for
producing Nb metal. Titanous slag can be employed for TiO_2 production. For
melting, sinter was used containing 25% perovskite and 75% titanium-magnetite con-
centrates. The Fe content in the sinter was 39 - 45%, TiO_2 content was 12 - 15%.
Melting was conducted in an ore-heating furnace with a cupola. Its capacity is

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veloping electric melting...

5,500 kvamp; the electrodes are arranged in a triangle, the diameter of the electrode configuration is 1,500 mm. The heats yielded Nb-cast iron and titanous slag. The medium TiO_2 content of the total slag amount was 34% at 1.0% FeO content. The cast-iron obtained contained up to 0.1; 0.2 and 0.3% Nb. The degree of Nb extraction into the cast iron was then 31.5, 63.0 and 44.5%. The average electric power consumption per heat was 2,880 kw-h/ton. The operational voltage during the melting process was 100 - 150 v. Prior to teeming the slag the furnace was switched-off. The temperature at which the slag was removed from the furnace was 1,450 - 1,500°C.

O. Svodtseva

[Abstracter's note: Complete translation]

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S/137/62/000/006/029/163
A006/A101

AUTHORS: Irkov, F. Ya., Reznichenko, V. A., Solov'yev, V. I., Solomakha, V.P.

TITLE: Utilization of slags from titanium-magnetite melting for the production of titanium dioxide and titanium tetrachloride

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 6, 1962, 13, abstract 6G95 (In collection: "Titan i yego splavy", no. 5, Moscow, AN SSSR, 1961, 279 - 281)

TEXT: Slags from titanium-magnetite melting are easily decomposed by 75 - 80% H_2SO_4 at 160 - 210°C within 3 hours. TiO_2 extraction is then $\geqslant$ 90%. The H_2SO_4-slag ratio varied from 1.2 to 2.8 (optimum ratio 1.4 - 1.5). To raise the TiO_2 content in the slags, they were additionally enriched with 24% HCl. Thus a Ti-concentrate with 68 - 69% TiO_2 was obtained. The Ti concentrate can be chlorinated and $TiCl_4$ obtained.

G. Svodtseva

[Abstracter's note: Complete translation]

Card 1/1

S/598/61/000/006/015/034
D245/D303

AUTHORS: Reznichenko, V.A., Lukashin, V.I., and Solov'yev, V.I.

TITLE: Aluminothermy of titanium slags

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Titan i
             yego splavy. no. 6, 1961. Metallotermiya i elektro-
             khimiya titana, 104 - 115

TEXT: The reduction of Ti slags with molten Al to yield crude Ti-
Al alloys was investigated. Experiments in reducing TiO_2 with ex-
cess Al to determine the effect of an excess of reducing agent on
the completion of reduction and the extent of Ti extraction from
TiO_2 were carried out. It is shown that excess of Al increases Ti
yield. While the reaction of TiO_2 with Al is exothermic, the heat
developed is insufficient to promote the reaction and it is shown
that an intensive reaction requires a temperature of $1450^\circ C$. Addi-
tion of CaO as flux does not affect the Al or Ti contents of the
resulting alloy. The proportion of CaO added should be 35-38 % of
slag, i.e. sufficient to ensure formation of a high-temperature Ca

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S/598/61/000/006/015/034
D245/D303

Aluminothermy of titanium slags

aluminate eutectic. TiO_2 content in the slags used in the experiments varied from 45 - 90 %. Reduction of the Ti oxides in slag with Al began spontaneously in the temperature range 1180 - 1250°C. Chemical analysis showed that 50 % of the TiO_2 at this temperature level, remained unchanged, 35 % was reduced to TiO, 5 % to Ti_2O_3 and 10 % Ti metal which formed a solution with excess Al. The Al content of the alloys obtained varied between 23 and 55 wt. % which corresponds to the $TiAl-Al_3$ section of the Ti-Al equilibrium diagram. 13 experiments were carried out in an aro furnace of ⬤kw to produce crude Ti. Melting was carried out with solid Al heated to 600°C or molten Al as reducing agent. With solid, heated Al, the reaction was rapid. With molten Al, the reaction was slow, only slag was produced and Ti recovery was 52 - 56 %. Electrolytic refining of the anode charge prepared from the crude alloy mixed with Tu wastes etc., to obtain Ti sponge in the cathode residue was also studied. There are 11 tables.

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REZNICHENKO, V.A.; SOLOV'YEV, V.I.

Titanium slags free from chromium oxide obtained from chromium-bearing iron-titanium concentrates. Titan i ego splavy no.8:
22-27 '62.   (MIRA 16:1)
    (Titanium—Metallurgy)   (Chromium oxide)
                            (Magnetic separation of ores)

REZNICHENKO, V.A.; TKACHENKO, V.A.; MIKELADZE, G.Sh.; KARYAZIN, I.A.;
KOZLOV, V.M.; NADIRADZE, Ye.M.; SOLOV'YEV, V.I.; GOGORISHVILI,
B.P.; Prinimali uchastiye: PKHAKADZE, Sh.S.; METREVELI, A.I.;
CHIKASHUA, D.S.; KHROMOVA, N.V.; KAVETSKIY, G.D.; TSKHVEDIANI,
R.N.; ARABIDZE, T.V.

Making titanium slag in an electric closed reduction furnace.
(MIRA 16:1)
Titan i ego splavy no.8:28-40 '62.
(Titanium—Electrometallurgy)

RUDNEVA, A.V.; MODEL', M.S.; SOLOV'YEV, V.I.

An iron-titanium mineral from placer deposits. Titan i ego splavy
no.9:10-15 '63.   (MIRA 16:9)
                        (Arizonite—Testing)
                  (Titanium compounds—Testing)

L 45966-66   EWT(1)/EWT(m)   CTB   JKT/DD/RD/JT/GD/JXI(C2)   UR/0000/66/000/000/0081/0084
                                     SOURCE CODE:

ACC NR: AT6030697

AUTHOR: Cherkasov, V. K.; Ushakova, G. S.; Figuzova, L. I.; Devyatko, A. V.; Mokhnov, V. G.; Solov'yev, V. I.; Portnova, K. M.; D'yakonov, R. V.; Martynova, R. A.; Ratts, L. B.

ORG: none

TITLE: The possibility of using the multifunctional properties of zeolites in a physical and chemical air-regeneration system

SOURCE: Konferentsiya po kosmicheskoy biologii i meditsine, 1964. Materialy. Moscow, Inst. mediko-biol. problem, 1966, 81-84

TOPIC TAGS: life support system, closed ecological system, space biology

ABSTRACT: A physical-chemical air "regeneration" system which has been proposed for manned spaceflight is shown in Fig. 1. In this system CO_2 is removed from cabin air by adsorption on zeolite. The carbon dioxide then undergoes vacuum desorption from the zeolite and passes through a CO_2 collector to the catalytic reactor, where it is reduced with hydrogen from the electrolyzer to water and methane. The water returns to the electrolyzer and is broken down into oxygen (used for human respiration) and hydrogen. The disadvantages of this method are the difficulties of creating a vacuum on board a spacecraft and the additional electrical energy required to operate the CO_2 collector. Studies have shown that specially treated B-zeolite
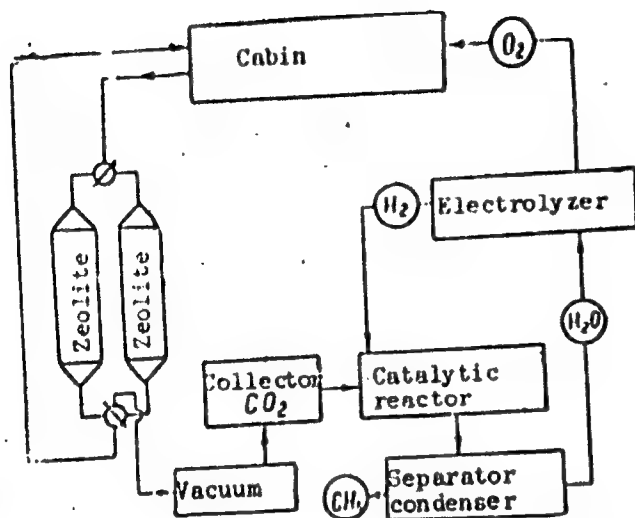
Card   1/3

L 45906-66

ACC NR: AT6030697

Fig. 1. Schematic diagram of a physical and chemical air "regeneration" system

can be used in such a system for both sorption and catalysis, retaining its properties through a number of cycles. An improved air "regeneration" scheme using B-zeolite is shown in Fig. 2. Cabin air is purified by passing through a B-zeolite

Card   2/3

L 45966-66
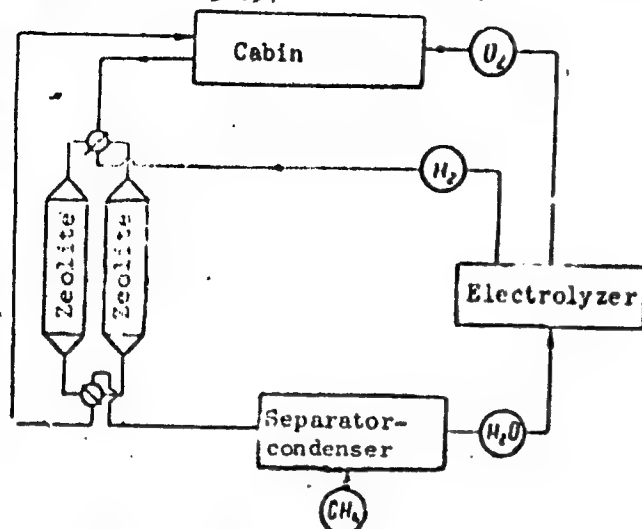ACC NR: AT6030697

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Fig. 2. Schematic diagram of a
physical-chemical air "regeneration"
system using B-zeolite

adsorber. Hydrogen derived from electrolysis is then passed through zeolite in a
second adsorber, simultaneously desorbing CO_2 and reducing it to water and methane.
The water is electrolyzed as in the first system. Temperature regulation is very
important for the successful operation of this system, since a 7—12C temperature
variation alters the gas conversion level by 10—15%. Orig. art. has: 3 figures.[JS]

SUB CODE: 06/ SUBM DATE: 14Apr66/ ATD PRESS: 5086
Card 3/3

SOLOV'YEV, V.I.

Reducibility of iron-titanium, chromium-containing concentrates from placer deposits. Titan i ego splavy no.9:82-85 '63.
(MIRA 16:9)

(Titanium—Metallurgy)
(Placer deposits)

REZNICHENKO, V.A.; SIRYAPOV, G.V.; SOLOV'YEV, V.I.

Two-stage smelting of ilmenite concentrates. Titan i ego splavy
no.9:96-104 '63.   (MIRA 16:9)
(Titanium—Electrometallurgy)

REZNICHENKO, V.A.; BOBROV, V.I.; REVYAKIN, A.V.; SOLOV'YEV, V.I.

Smelting titanium in a DVP-200-500 furnace. Titan i ego splavy
no.9:255-263 '63.   (MIRA 16:9)
                (Titanium—Electrometallurgy)

SOLOV'YEV, V.I.

Effect of Fe^{2+} impurities on ferromagnetic resonance in polycrystal-
line yttrium ferrates. Fiz. tver. tela 6 no.2:515-520 F '64.

(MIRA 17:2)